

members connected at first ends to opposite sides of the case; housing; and wherein the chip antenna comprises a chip an antenna contained in each C-shaped member.

14. (canceled).

15. (canceled).

16. (currently amended) An arm-wearable communication device according to claim 1; 11; wherein the wireless communication circuit deviee comprises a wireless telephone.

REMARKS

In the last Office Action, claims 1, 3 and 9 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,260,915 to Houlihan. Claim 8 was rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,569,879 to Gloton ("Gloton"). Claims 5-7 and 11-16 were rejected under 35 U.S.C. §103(a) as being unpatentable over Houlihan in view of Gloton. Claims 2 and 4 were rejected under 35 U.S.C. §103(a) as being unpatentable over Houlihan in view of U.S. Patent No. 5,943,020 to Liebendoerfer et al. ("Liebendoerfer"). Claim 14 was rejected under 35 U.S.C. §103(a) as being unpatentable over Houlihan in view of Gloton and Liebendoerfer.

By the present response, claims 8, 11, 14 and 15 have been canceled without prejudice or admission. Claim 1 has been amended to positively recite a case, to change recitation of a "communication device" to a --wireless communication circuit-- and to recite that the antenna disposed between the sound unit and wireless communication circuit of the arm wearable communication device is a chip antenna. Dependent claims 2-7 have been amended to conform to amended claim 1. Dependent claims 12, 13 and 16 have been amended to depend from independent claim 1 rather than canceled claim 11.

Accordingly, claims 1-7, 9, 10, 12, 13 and 16 remain pending in this application. For the reasons discussed below, applicants respectfully submit that the pending claims patentably distinguish over the prior art of record.

Although arm wearable communication devices have a very small case, the antenna used for such devices is usually not adequately small. Conventional arm wearable communication devices utilize a helical or whip antenna that projects from the case. During use of the device, the antenna must be extended from the device, such as by being incorporated into an earphone wire extending from the device to a user's ear. Loop antennas may also be disposed within the wrist strap of communication devices that are used while being worn on a user's arm.

More recently, however, arm wearable communication devices have been developed that are detached from the user's arm and held to the user's ear and mouth much like a conventional telephone handset. There are disadvantages associated with use of the above-described antenna types in this type of communication device. Since the conventional helical antenna extends from the device, it can easily be damaged by coming into contact with other objects during use. In addition, in order to reduce the influence of the transmission and reception sensitivity of the human body, consideration must be given to the manner in which the whip antenna is extended. Moreover, it is not realistic for the antenna to be extended at all times.

Although a loop antenna need not be extended from the device and may be disposed within the arm band, the length of the antenna changes significantly when the device is removed from the user's arm. This results in a large change in antenna sensitivity, particularly in the high frequency cellular telephony band.

The present invention overcomes the foregoing problems by providing an arm wearable communication device that may be used consistently while being worn on the user's arm or removed from the arm and held against the user's ear.

In accordance with one aspect of the present invention, the arm wearable communication device comprises a case, a wireless communication circuit disposed in the case for transmitting and receiving a signal, a wearable body pivotally mounted to the case to enable the device to be worn on a user's arm, a sound unit provided in the wearable body, and a chip antenna located between the sound unit and the wireless communication circuit and provided in the wearable body.

By the foregoing structure, the chip antenna is not accommodated in the case of the communication device but rather in the wearable body and is electrically connected to the communication device body through coupling parts between the chip antenna and the wearable body. Therefore, when the communication device is being worn on a user's arm, signal transmission and reception are carried out on the radius side and the ulna side of an arm. When the communication device is detached from the user's arm and placed up to the user's ear, signal transmission and reception is conducted without a reduction in antenna performance.

In the embodiment illustrated in Figs. 1 and 2 of the application drawings, the arm wearable communication device has first and second arm holders 2, 3 on opposite sides of a communication device body 1. The arm holders 2 and 3 are

pivotaly mounted by hinges which are respectively provided in coupling parts between the arm holders 2 and 3 and the communication device body 1. Chip antennas 4 and 5 each having a generally flat (or curved) shape are disposed inside the respective arm holders 2 and 3. The communication device body 1 is electrically connected to the chip antennas 4, 5 through the respective coupling parts, and is adapted to demodulate a received signal which has been received through the chip antennas 4 and 5 and to modulate a user's voice for transmission. In addition, the communication device body 1 is equipped with a console panel 26 (buttons, as shown in Fig. 5), a liquid crystal panel 27 and the like which are utilized by the user.

When the device 1 is being worn on the user's arm, the chip antennas 4 and 5 are located on the radius side 6 and the ulna side 7 of the arm to carry out signal transmission and reception. When the device 1 is detached from the user's arm and placed up to the user's ear for use, transmission and reception of signals is carried out while avoiding the grounding effect due to the human body.

In the arm wearable communication device of the present invention, when the device is detached from the user's arm and held in the users hand, as well as when it is being

worn on the user's arm, the influence of the human body is avoided so that superior telecommunication becomes possible. In addition, the arm wearable communication device is free from the electric wave shielding effect caused by coating. Also, by paying attention to the disposition of the antennas each having optimal directivity for when the device is being worn on the user's arm and when it is being held by the user's hand, the chip antennas each of which has a flat shape and has a single directivity are accommodated in the wearable bodies, respectively. As a result, antenna transmission and reception characteristics are adapted to conditions of actual use.

No corresponding structure is disclosed or suggested by the prior art of record.

Amended independent claim 1 recites an arm wearable communication device comprising a case, a wireless communication circuit contained in the case, a wearable body pivotally mounted to the case, a sound unit provided in the wearable body, and a chip antenna disposed between the sound unit and the wireless communication circuit in the wearable body.

Accordingly, claim 1 recites a chip antenna mounted between a communication circuit and a sound unit in a wearable body of an arm wearable communication device.

In accordance with dependent claim 2, the wearable body comprises a pair of wearable bodies attached to opposite sides of the case, the chip antenna comprises a chip antenna disposed in each of the wearable bodies, and the communication circuit compares signals received by the respective antennas.

Houlihan fails to anticipate the claimed invention. Houlihan discloses an arm wearable communication device 10 comprising a wireless communication circuit contained in a housing 20b for transmitting and receiving a signal and a sound unit 52 provided in a wearable body. Houlihan does not disclose an antenna disposed between the sound unit 52 and the communication device body in the wearable body.

Houlihan incorporates by reference U.S. Patent No. 4,847,818 to Olsen, which discloses a communication device body having a wearable body 5 pivotally mounted thereto to enable wearing the device on a user's arm, a sound unit 8 disposed in the wearable body 5, and conductor pairs 13, 14 serving as a dipole antenna embedded in the wearable body 5.

However, the dipole antenna of Olsen is not a chip antenna as required by amended independent claim 1.

The factual determination of anticipation requires the disclosure in a single reference of every element of the claimed invention. In re Spada, 15 USPQ2d 1655 (Fed. Cir.

1990); In re Bond, 15 USPQ2d 1566 (Fed. Cir. 1990). In the absence of any disclosure by Houlihan of a chip antenna as recited by amended independent claim 1, anticipation cannot be found.

For the foregoing reason, applicants respectfully submit that claims 1, 3 and 9 patentably distinguish over Houlihan.

Nor does the combination of Houlihan and Gloton render unpatentable the subject matter of claims 5-7 and 12-16. Gloton does not disclose a chip antenna as recited by amended independent claim 1 or dependent claims 5-7 and 12-16. Gloton discloses a micromodule for use in an intelligent credit card or the like.

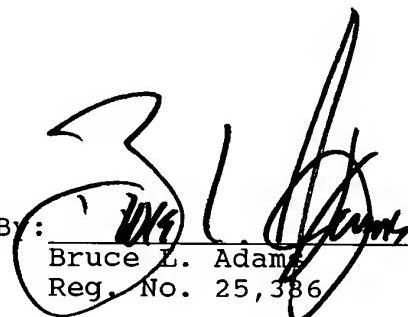
Liebendoerfer does not cure the foregoing defect. Liebendoerfer was cited as disclosing an antenna for use in a dielectric block of a radiotelephone. However, Liebendoerfer does not disclose or suggest the structure of amended independent claim 1, which recites a chip antenna disposed in a wearable member between a sound unit and a wireless communication circuit.

Accordingly, applicants respectfully submit that claims 1-7, 9, 10, 12, 13 and 16 patentably distinguish over the prior art of record and that the rejections under 35 U.S.C. §§ 102 and 103 should be withdrawn.

In view of the foregoing amendments and discussion, the application is now believed to be in condition for allowance. Accordingly, favorable reconsideration and allowance of the claims are most respectfully requested.

Respectfully submitted,

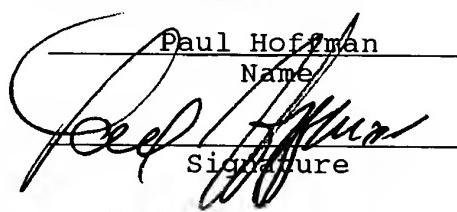
ADAMS & WILKS
Attorneys for Applicants

By: 
Bruce L. Adams
Reg. No. 25,386

50 Broadway - 31st Floor
New York, NY 10004
(212) 809-3700

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